April 6, 1937. A. J. PENICK ET AL 2,076,042

PRESSURE FLUID OPERABLE BLOW-OUT PREVENTER

Filed Feb. 25, 1935 3 Sheets-Sheet 1

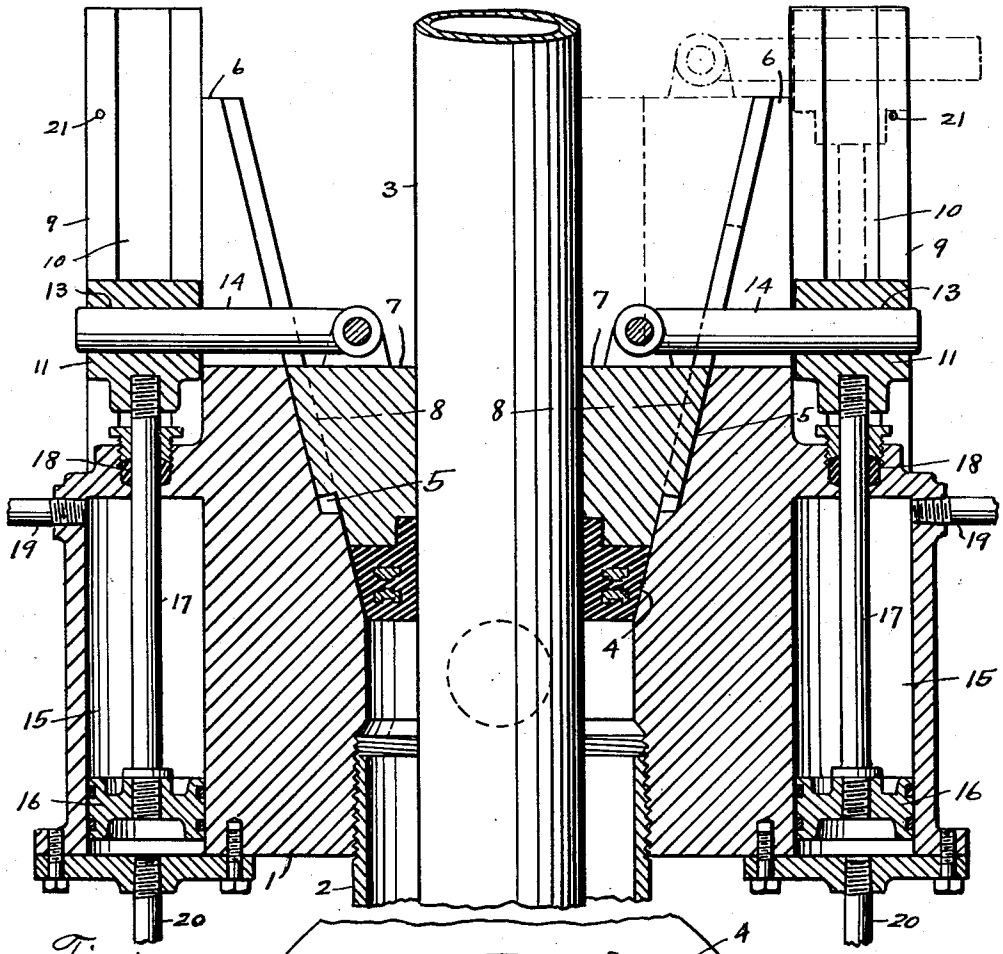


Fig. 1.

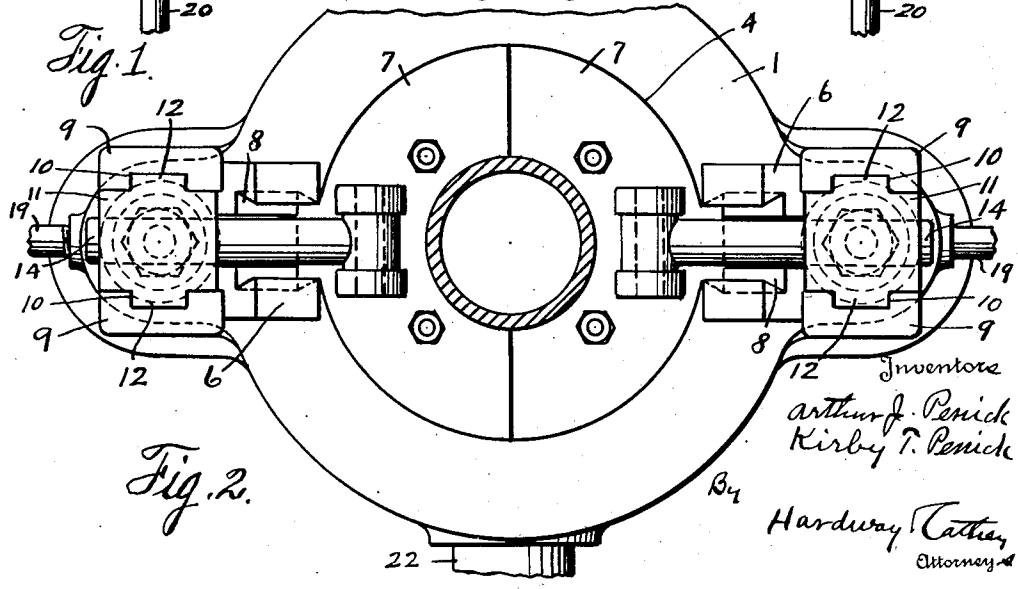


Fig. 2.

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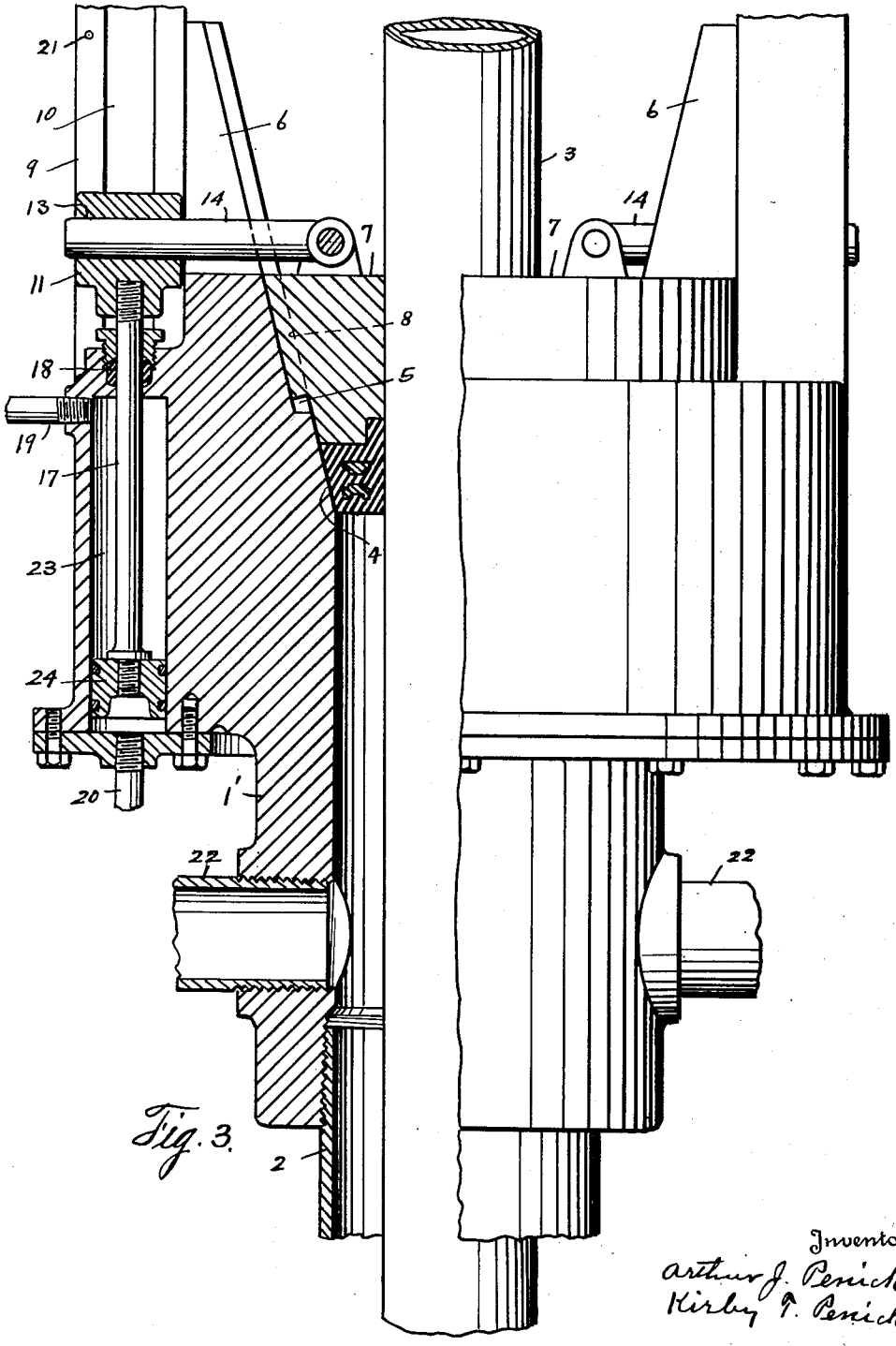


Fig. 3.

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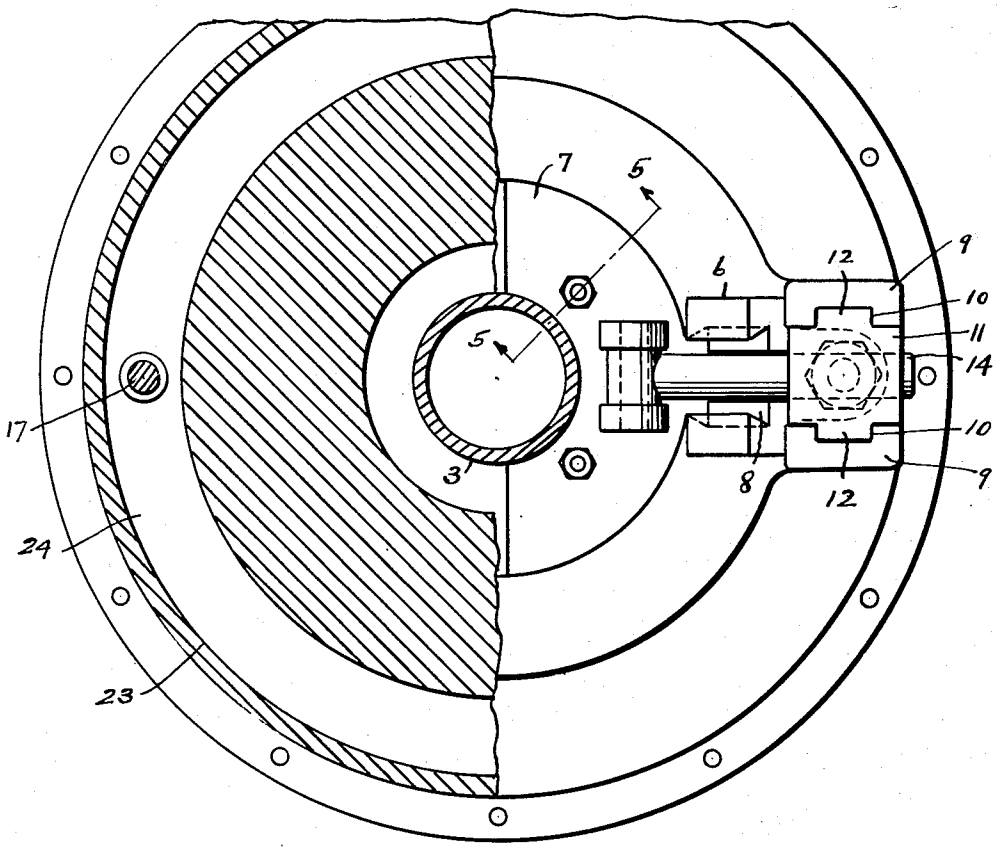


Fig. 4.

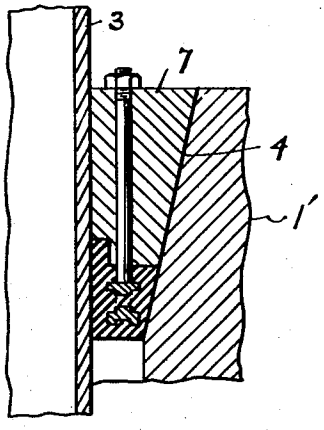


Fig. 5.

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PRESSURE FLUID OPERABLE BLOW-OUT PREVENTER

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Application February 25, 1935, Serial No. 8,039

9 Claims. (Cl. 166—15)

This invention relates to a pressure fluid operable blowout preventer.

An object of the invention is to provide apparatus of the character described especially adapted for use in well drilling for closing the space between a drill stem, or other inner pipe, and the casing head on the outer casing.

Another object of the invention is to provide in combination with a casing head having an internal seat of a pressure head normally maintained in inactive position so as not to interfere with well drilling operations or other operations being carried on in the well, with means for positively moving the pressure head into position upon said seat around the inner pipe to close the space between the casing head and inner pipe in case internal pressure is encountered in the well, and a blowout is threatened.

A further feature of the invention resides in the provision of means adapted to be actuated by fluid under pressure for moving the pressure head into either active or inactive position.

A still further object resides in the provision of apparatus of the character described having mechanical means for maintaining the pressure head in said inactive position.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation, and arrangement of parts, examples of which are given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a vertical sectional view of the apparatus.

Figure 2 shows a plan view.

Figure 3 shows a side view, partly in section, of a slightly modified form of the apparatus.

Figure 4 shows a plan view, partly in section, of said modified form, and

Figure 5 shows a fragmentary sectional view taken on the line 5—5 of Figure 4.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a casing head adapted to be connected to the upper end of the casing 2. The casing head is of a general tubular form to permit the passage of a drill stem or other pipe 3 vertically therethrough, and has the inside seat 4 preferably converging, or tapering downwardly. The seat 4 at the upper end thereof has the oppositely arranged dove-tailed grooves 5, 5, and these grooves diverge upwardly and continue up in the inside face of the guides 6, 6, which may be formed integrally with the casing head, and extend upwardly therefrom.

There is a pressure head composed of sections 7, 7. In the present instance, the pressure head is shown composed of two of said sections which are arcuate in cross-sectional contour to fit around the drill stem 3, and tapered downwardly to fit in the seat 4 when the pressure head is in active position closed about said drill stem.

The sections of the pressure head have the dove-tailed tenons 8, 8, which fit into the corresponding grooves 5.

Upstanding from opposite sides of the casing head are the spaced tracks 9, 9, whose facing sides have the vertical mortises 10, 10. Between the respective tracks 9 on each side are the plungers 11 whose sides have the vertical tenons 12, 12, which move in said mortises. These plungers have the transverse, or radial bearings 13, therethrough, and pivoted to the respective sections 7, at their inner ends, are the lift rods 14, 14, which are extended outwardly and which are slidably fitted through the bearings of said plungers. In the form shown in Figure 1, there are the vertical cylinders 15, 15, on opposite sides of the casing head 1, and in these cylinders are the respective pistons 16, 16.

Piston rods 17 are connected, at their lower ends, to the respective pistons, and their upper ends work through the stuffing boxes 18, 18, at the upper ends of the cylinders, and are attached to the corresponding plungers 11 above.

Each cylinder 15 is provided with two pressure fluid lines 19, and 20, entering the corresponding cylinder on opposite sides of the piston therein. These lines are connected with a suitable source of fluid under pressure such as steam, and may be controlled by appropriate control valves designed for the purpose.

When it is desired to elevate the pressure head out of active position, pressure fluid may be admitted through the lines 20 to elevate the pistons 16, and the respective sections 7 will correspondingly elevate, moving upwardly and outwardly along the guides 6 into position indicated by dotted lines in Figure 1, and as the pressure head sections move upwardly, the lift-rods 14 will move outwardly through the bearings 13, as also indicated by dotted lines in Figure 1. While the pistons 16 are moved upwardly, the lines 19 may be opened to permit the exhaust of the pressure fluid above the pistons.

When the pressure head is in its upper position, frangible pins, as 21, may be inserted through suitable holes in the tracks 9 beneath

the corresponding plungers 11 so as to hold the sections of the pressure head elevated while ordinary drilling operations are being carried on so that it will not be necessary to maintain pressure in the cylinders beneath the pistons to hold the pressure head sections elevated.

In case a blowout is threatened, fluid pressure such as steam may be introduced into the cylinders 15 above the pistons, and the valves controlling the lines 20 opened and said pistons will be forced downwardly causing the pins 21 to shear and causing the pressure head sections to be moved downwardly and inwardly on to the seat 4 about the inner pipe 3.

The pressure head will be locked or latched in said lower or active position by suitable means provided for that purpose and such as are now in common use. Latch-means such as disclosed in our co-pending application, Serial No. 4,258, filed January 31, 1935, may be used for that purpose.

The pressure head may be formed with suitable packing such as rubber, as illustrated in the drawings, for forming fluid-tight joints between the pressure head and inner pipe as well as between the pressure head and the seat 4. When the pressure head is in active position, the pressure fluid in the well may be drawn off through suitable outlet lines 22 leading from the casing head beneath the seat 4.

In the form shown in Figures 3 and 4, the casing head 1 is formed with an annular cylinder 23 in which there is located an annular piston 24, and the piston rods 17, 17, are attached at their lower ends to the pistons 24 and extend up through the stuffing boxes 18 and are connected to the plungers 11 above. In other respects, the forms shown in Figures 3 and 4 are similar in construction and operation to the forms shown in Figures 1 and 2.

The drawings and description disclose what are now considered forms of the invention by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What we claim is:—

1. The combination with a casing head having a seat, of a pressure head shaped to fit the seat and to surround an inner pipe in the casing head, said pressure head being formed of sections, upwardly diverging guides upstanding above the casing head on which said sections are slidably mounted.

2. The combination with a casing head having a seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, upwardly diverging guides above the head along which the sections may move into active position onto, and into inactive position, away from, the seat.

3. The combination with a casing head having a seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, guides along which the sections may move into active position onto, and into inactive position, away from, the seat, said guides diverging upwardly to space the sections away from the inner pipe when in said inactive position, fluid pressure operable means for actuating the pressure head.

4. The combination with a casing head having a seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, upwardly diverging guides along which the sections may move into active position onto, and into inactive position, away from, the seat, a means connected to the sections and operable by fluid, under pressure, to so move the sections.

5. The combination with a casing head having a seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, guides along which the sections may move into active position onto, and into inactive position, away from, the seat, said guides diverging upwardly to space the sections away from the inner pipe when in said inactive position and means connected to the sections and operable by fluid, under pressure, to so move the sections.

6. In a blowout preventer, a casing head having a seat, a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, fluid pressure operable means for moving the sections upwardly from the seat and outwardly from the inner pipe into inactive position, and downwardly and inwardly onto the seat and around the inner pipe, into active position.

7. In a blowout preventer, a casing head having a seat, a pressure head formed of sections and shaped to fit said seat and to surround an inner pipe through the casing head, and means adapted to be operated by fluid, under pressure, for moving the sections into inactive position, upwardly and outwardly from the seat, or into active position downwardly and inwardly onto the seat about the inner pipe.

8. The combination with a casing head having a seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, upwardly diverging guides along which the sections may move into active position onto, and into inactive position away from, the seat, tracks upstanding from the casing head, plungers movable along the tracks, lift-rods connected to the sections and having slidable connections with the plungers and means operable by fluid under pressure for actuating the plungers to effect the movements of the pressure-head sections.

9. The combination with a casing head having an inside seat, of a pressure head formed of sections and shaped to fit the seat and to surround an inner pipe through the casing head, upwardly diverging guides along which the sections may move into active position onto, and into, inactive position away from the seat, tracks upstanding from the casing head plungers movable along said tracks and provided with radial bearings, lift rods pivotally connected to the sections and slidable through said bearings and means operable by fluid under pressure for actuating the plungers to effect the movements of the pressure head sections.

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